

**CITY OF GLENWOOD SPRINGS
SPECIAL PROVISIONS
SOUTH MIDLAND AVE. IMPROVEMENTS**

The 2019 Standard Specifications for Road and Bridge Construction controls construction of this project. The following special provisions supplement or modify the Standard Specifications and take precedence over the Standard Specifications and plans.

PROJECT SPECIAL PROVISIONS

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**REVISION OF SECTION 105
COOPERATION BETWEEN CONTRACTORS**

Section 105 of the Standard Specifications is hereby revised for this project as follows:

Subsection 105.12 shall include the following:

Other construction agencies or COGS maintenance may be working in the vicinity of the project. The Contractor shall conduct the work so as not to interfere with or hinder the progress or completion of the work being performed by other agencies or COGS maintenance. All traffic control conflicts that arise between the needs of the various construction contractors and other agencies shall be brought to the attention of the Engineer. The Project Engineer will decide the method of resolution.

It is anticipated the following projects will be working within S. Midland during the 2020-2021 construction season:

Black Hills Energy (BHE) – S. Midland System Upgrades

Contact: Jason Cox

Phone: (970) 949-3117

Project description: The BHE project has been designed to move and adjust the existing system to accommodate proposed S. Midland Project elements. The anticipated duration of work for the BHE project is 3 months and they are anticipated to work from North to South. The earliest start date for BHE is November 12, 2020. The BHE Project Plans are included with addendum 2. The contractor shall coordinate all aspects of work with BHE and their contractors for the duration of the overlapping schedules.

The contractor will not be afforded additional contract time or compensation for this coordination.

Due to the number of projects within S. Midland during the work, the Engineer, Project TCS, and Project Superintendent shall attend coordination meetings as necessary with the respective TCSs, PIMs, Project Superintendents, and Engineers of all other concurrent projects within S. Midland. This will ensure proper messaging and coordinated traffic control for all projects.

END OF SECTION REVISION

**REVISION OF SECTION 603
CULVERTS**

Section 603 of the Standard Specifications is hereby revised for this project as follows:

In subsection 603.13 delete the 3rd paragraph and replace with the following:

Structure excavation and structure backfill will not be measured and paid for separately but shall be included in the work.

END OF SECTION REVISION

**REVISION OF SECTION 613
LIGHTING AND ELECTRICAL - CITY FURNISHED ITEMS**

Section 613 of the Standard Specifications is hereby revised for this project as follows:

Subsection 613.02 shall include the following:

Glenwood Springs Electric Department will provide materials as noted in the plans and the Contractor will be responsible for installing these items as shown in the plans and as directed by the City. Items to be provided by the City and installed by the Contractor include conduits, pull boxes, splice vaults and broadband cabinets.

Items to be provided by the Contractor and installed by the Contractor include light standard foundations and light standards (pole and arm).

Glenwood Springs Electric Department will install all wiring and all luminaire fixtures.

The Contractor shall grout or block all knockout holes in the vaults to prevent backfill material from entering the holes and to prevent settling of the backfill around the vault. This will not be paid for separately but shall be included in the work.

END OF SECTION REVISION

SECTION 02555

WATER TRANSMISSION AND DISTRIBUTION LINES

PART 1 GENERAL

1.01 SUMMARY

- A. Work under this Section shall include furnishing all materials, labor, equipment and miscellaneous items necessary to install, disinfect, and test all potable water, non-potable and yard piping distribution and transmission pipelines and appurtenances as specified herein and shown on the Drawings.

1.02 PROTECTION OF WORK

- A. All pipe fittings, valves and equipment shall be carefully handled, stored and protected in such a manner as to prevent damage to materials and protective coatings and linings. At no time shall such materials be dropped or dumped into trench
- B. Precaution shall be taken to prevent foreign matter from entering the pipe, fittings and valves prior to and during installation. Place no debris, tools, clothing or other materials in the pipe during installation.
- C. At such time as pipe installation is suspended, either temporarily or overnight, the open end of the pipe shall be sealed with a watertight plug to prevent entrance of trench water, debris or foreign matter.
- D. Under no circumstances shall trench water be allowed to enter the pipeline. When water is present in the trench, the seal shall remain in place until such time as the trench is pumped dry. Whenever trench water becomes evident, adequate measures shall be taken to prevent pipe floatation.
- E. If, in the opinion of the City, the Contractor is incapable of keeping the pipe free of foreign matter during installation, the City shall require the Contractor to cover the pipe ends with close woven bags until the start of the joining operation.

PART 2 PRODUCTS

- A. This item covers the types of materials that will be required for the construction and installation of water lines. All materials used shall be new, of the best quality available, and conform to applicable standards as indicated herein.

2.01 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile Iron Pipe
 1. Reference Standard - ANSI 21.51/AWWA C151, latest edition.
 2. Thickness Class – 52.
 3. Pipe joints shall be push on, except where specifically shown or detailed otherwise.
 4. Pressure Rating - 350 psi.

5. Pipe shall be polyethylene encased.

B. Fittings

1. Type - All fittings shall be mechanical joint, except where specifically shown or detailed otherwise.
2. Reference Standard - ANSI/AWWA C153, latest edition, for mechanical "compact" joints.
3. Material - Ductile iron, DIP fittings, sleeves and valves shall be polyethylene encased.
4. Pressure Rating - 350 psi.

C. Joints

1. Mechanical, Reference Standard - ANSI A. 21.53/AWWA C153, latest edition.
2. Push-on, Reference Standard - ANSI A 21.15/AWWA C115, Class 125.
3. Flanged, Reference Standard - ANSI B 16.1, Class 125.

D. Gaskets

1. Gasket shall be suitable for the specified pipe sizes, pressure and temperature.
2. Reference Standard - AWWA C111, latest edition.
3. Lubricant – A non-toxic vegetable soap lubricant shall be supplied with the pipe.

E. Protective Coating

1. All shop finishes, coatings, sealers, and treatments must be adhere to law 40 CFR Volatile Organic Compound Content Limits for Architectural Coatings, in effect beginning May 1st, 2020.
2. Underground Service - Manufacturer's standard bituminous coating
3. Polyethylene Film Envelope - Polyethylene encasement shall conform to AWWA C105, latest edition, or ANSI A.21.5. Film shall be Class C with a nominal thickness of 8 mils. Tape for securing the film shall have a minimum thickness of 8 mils and a minimum width of 2 inches. The polyethylene film shall be free of streaks, pinholes, tears or blisters.

F. Protective Lining

1. Type – "Standard Cement Mortar Lining"
2. Reference Standard - ANSI A 21.4/AWWA C104, latest edition.
3. Thickness – standard

2.02 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. PVC Pipe

1. Materials - ASTM D1784, Type 1, Grade 1, PVC 1120, 2000 psi design stress.
2. Reference Standard - AWWA C900, latest edition, 4" - 12"
3. Class - 200 (DR-14), 4" - 12".
4. Reference Standard - AWWA C905, latest edition, 14" - 48".
5. Class - 235 (DR-18), 14" - 48".
6. Reference Standard - AWWA C909, latest edition. Use of this pipe requires City approval.
7. Markings - Manufacturer's name, nominal size, class pressure rating, PVC 1120, NSF logo, identification code.
8. Size - Shall conform to outside diameter of DIP.

B. Fittings

1. Type - All fittings shall be mechanical joint except where specifically shown or detailed otherwise.
2. Reference Standard - ANSI/AWWA C110/A.21.10 or C153/A.21.53, latest edition.
3. Pressure Rating - 250 psi for C110; 350 psi for C153.
4. Gasket Reference Standard - AWWA C111, latest edition
5. DIP fittings, sleeves and valves shall be polyethylene encased.

C. Joints

1. Push-on rubber gasket.
2. Gasket Reference Standard - AWWA C111, latest edition.

2.03 HYDRANTS

A. Fire Hydrant - Dry Barrel Type

1. Reference Standard - AWWA C502, latest edition.
2. Outlet Size - one 4½ inch, two 2½ inch.
3. Hydrant Size - 5 ¼ inch.
4. Inlet Size - 6 inch.
5. Operation - 1½-inch pentagonal national standard operating nut, open counterclockwise.
6. Special Features - outlet hydrant shall open when turned to the left (counterclockwise).
7. Depth of Bury - As shown on Drawings
8. Additional Requirements - Furnish hydrant complete with pipe and tee, 6 inch (6") restrained mechanical joint gate valve and thrust blocks.
9. Traffic Model with breakaway bolts and coupling.
10. Manufacturers Reference - Mueller Super Centurion A423, or Kennedy K81D.

B. Yard Hydrant

1. Inlet Size - 1 inch.
2. Overall Bury Depth – As shown on drawings.
3. Operation – freezeless with backflow preventer and hose connection.
4. Manufacturer Reference – Woodford Freezeless Sanitary Yard Hydrant Model S3 or Equal.

2.04 VALVES

A. Gate Valves

1. See gate valve specification.

B. Butterfly Valves

1. See butterfly valve specification.

C. Combination Air Release Valve

1. Size - As recommended by manufacturer for correct application.
2. Inlet - Pipe Thread FNPT.
3. Materials
 - a. Body - Nylon Body or Cast Iron.
 - b. Float - Stainless Steel.

- c. Seat - Buna-N.
- d. Lever Frame – Delrin.
- 4. Pressure Rating - 200 psi.
- 5. Manufacturer's Reference – ARI 040 Series. Or manufacturers will be considered on a case by case basis.
- 6. Performance - Permits efficient filling or draining of long pipelines, for protection against vacuum, and will continuously vent pockets of air as they accumulate in pipeline.

2.05 VALVE BOXES

- A. Screw Type - Three Piece
 - 1. Material - Cast Iron
 - 2. Size - 5 1/4-inch diameter
 - 3. Type - Three-piece adjustable screw type
 - 4. Cover - Deep socket type with the work "water" cast in the top
 - 5. Base - #160 type with 20.5" bottom opening

2.06 MUD PLUGS & DEBRIS CAP

- A. The City's preference is to use mud plugs, but debris caps will be considered on a case by case basis.
 - 1. Mud plugs shall be manufactured by Infact Corporation or equal approved by City
 - 2. Flexible caps shall be manufactured by SW Services, Inc. or equal approved by City.

2.07 MECHANICAL COUPLINGS

- A. Only M.J. ductile iron solid sleeves allowed.

2.08 WATER SERVICE & TAP COMPONENTS

- A. Corporation Stops
 - 1. Material - Brass or bronze
 - 2. As shown on Drawings
 - 3. Reference Standard - AWWA C800, latest edition
 - 4. Thread inlet - IP
 - 5. Thread outlet - Compression connection
 - 6. Manufacturer's Reference - Mueller B-25028N or equivalent if approved by City.
- B. Copper Service Pipe (for sizes up to 2 inch)
 - 1. Reference Standard - AWWA C800
 - 2. Material - Type K, ASTM B88
 - 3. Size - As shown on Drawings
- C. Eagle Pure-Core HDPE Service Pipe (for sizes up to 2 inch)
 - 1. Reference Standard - AWWA C901
 - 2. Material – SDR9 CTS, HDPE 3408, ASTM D2239 and ASTM D2737
 - 3. Size - As shown on Drawings
- D. Curb Box

1. Material - Cast iron box, complete w/lid and red brass screw, stationary/extension rod shall also be provided.
2. Type – Mueller H-10308

E. Curb Stop

1. Materials - Cast bronze body, resilient O-ring seal, standard tee-head operator Teflon ball valve
2. Size - As shown on Drawings
3. Inlet - Copper service thread
4. Outlet - Copper service thread Manufacturer's Reference - Mueller B-25209N

F. Service Saddle

- a. Materials - Bronze service clamp, O-ring gasket, double stainless-steel strap, and IP threads.
- b. Manufacturer's Reference - Mueller BR-2S Series, Smith Blair 317, or equal if approved by City.

2.09 JOINT RESTRAINTS

A. Mechanical Joint Retainer Glands

1. For use with ductile iron pipe:
 - a. Materials - Multiple wedge, ductile iron ASTM A536, 60-42-10 minimum.
 - b. Manufacturer's reference - EBAA Iron Series 1100 Megalug
2. For use with PVC pipe:
 - a. Materials - Multiple wedge ductile iron A536, 60-42-10 minimum.
 - b. Manufacturer's reference - EBAA Iron Series 2000PV Megalug

B. Push-on Joint Restraints

1. For use with ductile iron pipe:
 - a. Materials - Ductile iron retainer gland and restraint ring ASTM-536, 60-42-10 minimum, 526 alloy steel tie bolts ANSI/AWWA C111/A21.11.
 - b. Manufacturer's reference - EBAA Iron Series 1700 Megalug restraint harness.
2. For use with PVC pipe:
 - a. Materials - Ductile iron restraint harness ASTM 536, 60-42-10 minimum.
 - b. Manufacturer's reference - EBAA Iron Series 1600 (C-900) and Series 2800 (C-905) and Series 1900 (C-909).

2.10 REPAIR CLAMP

- A. Stainless steel, full circle, Smith Blair 256 with stainless lugs or equal if approved by City

2.11 TAPPING SLEEVES

- A. Type - Split-body, O-ring sealed with flanged outlet. Stainless Steel body and hardware, full circumference.
- B. Manufacturer's reference - Smith Blair Model 665.

2.12 ENCASUREMENT

- A. Mains to be installed inside casings shall be installed with self-restraining casing spacers. Casing spacers shall provide axial thrust restraint to prevent pipe deflection during and after installation.

2.13 CONCRETE FOR THRUST BLOCKS AND ENCASING OF PIPE

- A. Concrete for thrust blocks and for encasing the water pipeline shall have a 28-day compressive strength of not less than 4000 psi.

2.14 TRACER WIRE

- A. No. 12 gauge insulated, stranded copper. All splices to be watertight, underground type, (Tracer wire is required for all pipes and services).

2.15 MAGNETIC TAPE

- A. Detectable marking tape shall consist of a minimum of 5 mil (0.0005") overall thickness; five-ply composition; ultra-high molecular weight 100% virgin polyethylene; acid alkaline and corrosion resistant.
- B. Elongation properties shall be in accordance with ASTM D882-80A and shall be less than 150% at break. The tape shall have a 20-gauge (0.0020") solid aluminum foil core, encapsulated within 2.55 mil (0.00255") polyethylene backing.
- C. Tape color and legend combination shall be in accordance with APWA. The color shall be blue. The legend shall read "CAUTION - WATERLINE BELOW".
 - 1. The tape tensile strength shall be in accordance with ASTM D882-80A and be not less than 7800 psi.
 - 2. Tape width shall be 3/4 of the diameter of the pipeline being protected

Tape Width	2"	3"	6"	12" or wider
Tape Bury Depth	6"- 18"	6"- 28"	6"- 36"	6"- 36"
 - 3. The tape shall be as manufactured by T. Christy Enterprises, or equal.
 - 4. Magnetic tape is required for all pipe and shall be 2 feet above the top of pipe.

PART 3 EXECUTION

3.01 CLEANING AND INSPECTION

- A. Clean all pipe, fittings, valves and related material thoroughly of all foreign material and inspect for cracks, flaws or other defects prior to installation. Mark all defective, damaged or unsound materials with bright marking crayon or paint and remove from jobsite.
- B. The Contractor shall take all necessary precautions to prevent any construction debris from entering the water lines during construction of water lines and appurtenances. If this debris should enter the distribution system, the Contractor shall furnish all labor and material necessary to clean the system. Under no circumstances will the Contractor flush the debris into an existing distribution system.

3.02 VERIFICATION

- A. Verify dimensions and class of all existing and proposed pipe, valves, fittings and equipment prior to installation to ensure the piping system will fit together properly.

3.03 PIPE EMBEDMENT

- A. Placing Embedment Material - Refer to Section Trenching, Backfilling, and Compaction for placement methods.
- B. Embedment Classes - Refer to Section Trenching, Backfilling, and Compaction and Construction Drawings for embedment materials as listed below:
 - 1. Pipe shall be embedded according to applicable details within the specifications and on the Construction Drawings.

3.04 PIPE INSTALLATION

- A. Methodology. Pipe shall be laid in straight section with bell ends facing the direction of laying unless otherwise directed by the City. Where pipe is laid on a grade of ten percent (10%) or greater, the installation shall proceed uphill with the bell ends facing upgrade. The pipeline shall be installed so that a continuous positive or negative grade is maintained between high and low points to avoid air pockets. Jointing of the pipe shall be made in accordance with the directions of the manufacturer of the pipe and the manufacturer of the coupling.
 - 1. The pipe shall be brought to correct line and grade, and secured in place with the specified bedding material as directed in Section Trenching, Backfilling, and Compaction.
- B. Pipeline Depth. As indicated on Drawings, but always below frost level, 5.5' minimum. Depth shall be based on depth below finished grade of a project and not existing grade. Contractor shall be responsible for keeping pipelines from freezing if fire line is temporarily installed above frost line before fill material is installed.
- C. Pipe Encasement.
 - 1. Water mains to be installed inside casings and be installed with self-restraining casing spacers when separation distances from pollution sources cannot be met.
 - 2. Install concrete encasement only when allowed by the City. Concrete shall have a four thousand (4,000) psi compressive strength. Reinforcing shall consist of four (4) evenly spaced longitudinal No. 4 rebar.
- D. Installation of Ductile Iron Pipelines
 - 1. Pipe Handling. Pipe should be lowered into the trench with ropes, slings or machinery. Under no circumstances should the pipe be pushed off the bank and allowed to fall into the trench.
 - 2. Pipe Laying. Pipe shall be laid in straight sections, in an uphill direction, with bell ends facing in the direction of laying, unless directed otherwise by the City.
 - 3. Jointing of Push-on Joints. In joining the pipe, the exterior four inches of the pipe at the spigot end and the inside of the adjoining bell shall be thoroughly cleaned to remove oil, grit, tar (other than standard coating) and other foreign matter. The gasket shall be placed in the bell as per manufacturer's installation instruction. A thick film of the pipe manufacturer's joint lubricant shall be applied

- to the gasket over its entire surface. The spigot end of the pipe shall then be wiped clean and inserted into the bell to contact the gasket. The pipe shall be forced all the way into the bell by crowbar or by jack and choker slings. Check the position of the gasket with a feeler gauge to ensure it is not rolled.
4. Pipe Cutting. The cutting of pipe for fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe. The flame cutting of pipe by means of an oxyacetylene torch will not be allowed.
 5. Polyethylene Film Envelope. Encase main and fittings using procedures recommended by manufacturer. Special care shall be used at all overlap joints.
- E. Installation of Polyvinyl Chloride (PVC) Pipe.
1. Pipe Handling. Pipe should be carefully lowered into the trench to avoid pipe falling into trench.
 2. Pipe Laying. Pipe shall be laid in straight sections with bell ends facing the direction of laying. When pipe laying is not in progress, the open end of the pipe shall be closed by a watertight plug.
 3. Jointing the Pipe. The outside of the spigot and the inside of the bell shall be thoroughly wiped clean. Set the rubber ring in the bell with the marked edge facing toward the end of the bell. Lubricate the spigot end using a thin film of the manufacturer-supplied lubricant. Push the pipe spigot into the bell. Position the completed joint so that the mark on the pipe end is in line with the end of the bell.
 4. Pipe Cutting. The cutting of pipe for fitting or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe and so as to leave a smooth end at right angles to the axis of the pipe. Bevel the end of the pipe with a beveling tool after the pipe is cut. Place a clearly visible position mark at the correct distance from the end of the field-cut pipe.

3.05 INSTALLATION OF PIPELINE APPURTENANCES

- A. General. Install all valves, meters, manholes, and other equipment appurtenant to pipeline at the locations indicated on the drawings or as otherwise designated by the City to accommodate field conditions. Document "record" measurements prior to backfill referencing all appurtenant equipment to the nearest permanent surface improvement.
- B. Installation of Valves. Install valves in the pipeline in the same manner specified for laying and jointing the pipe and in accordance with details included in drawings.
- C. Valve Boxes. Except where specified otherwise, install valve boxes on all buried valves. Install boxes such that no stress is transmitted to the valve. Set boxes plumb and directly over the valve with the top of the box placed flush with the finished grade. Backfill and thoroughly compact around each box. Provide extended stems on valves where required such that the operating nut is not lower than two feet (2') below finished grade. Extended stems will be handled on a case by case basis.
- D. Mud Plugs & Debris Caps
 1. Mud Plugs and debris caps shall be installed as close under the cast iron cover without interfering with cover operation.
 2. Mud plugs and debris caps shall be trimmed to provide a smooth contact with the interior diameter of the pipe.

- E. Fire Hydrants. Install hydrants in accordance with the standard details on the drawings. Hydrant to be set plumb and true to grade. Contractor to bag or cover the fire hydrant that is not in operation, and remove all existing fire hydrants along the waterline corridor.
- F. Joint Restraint. Concrete thrust blocks shall be provided, as shown in the details included with the Drawings for all tees, elbows, plugs, reducers, valves, fire hydrants and crosses if one or more sides of the cross is plugged. The bearing area of the block shall be at least equal to that stated on the drawings. The bearing surface shall be against undisturbed earth. The block shall be placed normal to the thrust as shown on the drawings. Concrete for thrust blocks shall have four thousand (4,000) psi compressive strength. Concrete support blocks shall be placed under all valves.
 - 1. Contractor will be required to use either plywood forms or plastic to protect the nuts and bolts on the fittings when the concrete reaction block is placed.
 - 2. Mechanical joint retainer glands and push-on joint restraint devices to be used as shown on the Drawings. Contractor to verify prior to construction.
 - 3. Contractor to also use joint restraint or wood blocking as a method of temporary restraint to secure fittings while concrete reaction blocks set up. (Note: Temporary restraint to be used for those cases where a tie-in is being made and the water needs to be turned back on as soon as possible).

3.06 CONNECTION TO EXISTING WATER FACILITIES

- A. All main line connections between existing and proposed piping shall be made during non-business hours or at a time which is acceptable to the Owner. All shut-offs shall be planned 72 hours in advance and all persons affected by the shut-off shall be given a 48-hour notice in the local newspaper, local radio, and/or other methods requested by the City at the Contractor's expense. In addition, the Contractor shall personally warn those affected 1 hour before the water is shut off.
- B. The tie-ins between existing and proposed mains shall be made so that both the proposed main and existing main are in service at the same time. Only after the new main is tested, approved and in service can the individual proposed service lines tie into the existing service line on the building side of the curb valve. The affected property shall be given a minimum of one (1) hour notice before the water is shut off. The new line must have passed the pressure testing and bacteriological test prior to connecting the services to the proposed waterline.
- C. Remove existing curb boxes and locate new curb boxes on property line unless otherwise instructed by the City. Contractor is to provide all necessary fittings needed to reconnect service line on property side of curb box. Contractor shall notify City if existing service line is leaking prior to connection. Contractor shall be responsible for repair of existing service line if it is leaking after connection is made. Contractor shall keep the connection to existing pipe exposed, and notify City, and again approval from City prior to backfilling over connection to existing service line.
- D. Take all precautions to prevent contamination when making connections to existing potable water lines. No trench water, mud or other contaminating substances shall be permitted to enter the pipeline.
- E. Swab the interior of all new pipe, fittings and valves installed in the existing pipeline with a minimum one percent (10,000 ppm) chlorine solution per AWWA standards prior to

installation. After the connection is completed, flush the main to remove all contaminated water.

3.07 SERVICE CONNECTIONS

- A. Customer service connections shall be installed in accordance with the details set forth on the Drawings. Terminate the service with a curb stop and box and mark with a stake except where shown otherwise on the Drawings.

3.08 TRACER WIRE

- A. Tape electrical tracing wire to the top of the pipe at 5-foot intervals to prevent dislocation of the wire during backfilling. Extend wire to ground surface at all valves, fire hydrants, and other locations shown on drawings. The tracing wire shall be brought up on the outside of the valve box. When the wire is within 4" of the top of the lid, the wire shall be brought back inside the box and securely fastened. Provide sufficient slack in the wire outside of the box to compensate for any future adjustment to the valve box. Required on all water mains.

3.09 HYDROSTATIC TESTS

- A. Make pressure and leakage tests on all newly laid pipe. Furnish all necessary equipment and material, make all taps in the pipe as required, and conduct the tests. The tests shall be conducted between valved sections of the pipeline, or as approved by the City. The City will observe tests but contractor is responsible for the testing. Contractor will be required to submit certification that all tests were performed per the City Rules and Regulations and these Specifications.

- B. Furnish the following equipment and material for the tests:

Amount	Description
2	Approved graduated containers.
2	Pressure gauges.
1	Hydraulic force pump approved by the City.
1	Additional 1/2 inch pressure tap for City's test gauge. Suitable hose and suction pipe as required.

- C. Conduct the tests after the trench has been partially backfilled with the joints left exposed for inspection, or when completely backfilled, as permitted by the City. Where any section of pipe is provided with concrete reaction blocking, do not make the pressure test until at least 5 days have elapsed after the concrete thrust blocking is installed. If high-early cement is used for the concrete thrust blocking, the time may be cut to 2 days.

- D. Conduct pressure test in the following manner, unless otherwise approved by the City: after the trench has been backfilled or partially backfilled as hereinbefore specified, fill the pipe with water, expelling all air during the filling. The test pressure shall be 1 and a half times normal working pressure at the point of lowest elevation of the test gauge. Pressure tests on lines used for fire service shall be pressure tested per NFPA 24 requirements.

- 1. Duration

- a. The duration of each pressure test shall be 2 hours, unless otherwise directed by the City.
2. Procedure
 - a. Slowly fill the pipe with water and allow to stand for 24 hours. Expel all air from the pipe. Allow and maintain the specified test pressure by continuous pumping if necessary for the entire test period. The test pressure shall be calculated for the point of lowest elevation, or as specified by the City. The pump suction shall be in a barrel or similar device, or metered so that the amount of water required to maintain the test pressure may be measured accurately.
 - b. Before the line is pressurized, the City shall verify that all necessary main line valves are open or closed with regard to the section of line being tested. In addition, the City shall verify that all hydrant valves are open.
3. Leakage
 - a. Leakage shall be defined as the quantity of water necessary to hold the specified test pressure for the duration of the test period. No pipe installation will be accepted if the leakage is greater than the number of gallons per hour as determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148,000}$$

In the above formula:

L = Allowable leakage, in gallons per hour.

S = The length of pipe being tested, in feet.

D = Nominal diameter of pipe, in inches.

P = Average test pressure during the leakage test, in pounds per square inch gauge.

- b. The pressure testing of water service lines shall follow the same procedure as outlined in the section. In all cases, however, the corporation stop, service line and curb stop shall be visually inspected under full test pressure and any leaks fixed.
4. Correction of Excessive Leakage
 - a. Should any test of pipe laid disclose leakage greater than that allowed, locate and repair the defective joints or pipe until the leakage of a subsequent test is within the specified allowance.

3.10 DISINFECTION OF POTABLE WATERLINES

- A. General. Flush and disinfect potable waterlines in accordance with the procedure set forth in AWWA C651, latest edition, Disinfecting Water Mains.
- B. Provide all temporary blow-offs, pumps, chlorination equipment, chlorine and all other necessary apparatus required.
- C. Pipe Cleaning. If the pipe contains dirt or heavy encrusted matter that, in the opinion of the City, will not be removed during the flushing operation, the Contractor shall clean and swab the interior of the pipe with a minimum one percent (10,000 ppm) chlorine solution per AWWA standards.

- D. Preliminary Flushing. Flush pipeline prior to disinfection, except when the tablet method is used, to remove all remaining foreign material. The flushing operation shall develop a minimum velocity of 2.5 ft./sec. Flushing of lines used for fire service shall be pressure tested per NFPA 24 requirements.
- E. Chlorine Application. In general, the City's preferred method of chlorine application is the tablet method.
1. Continuous Feed Method. Introduce water into the line at a constant rate while adding chlorine at a minimum concentration of 50 mg/l. Maintain the chlorinated water in the pipeline for a minimum of 24 hours after which period the treated water shall contain no less than 10 mg/l of chlorine throughout the entire length.
 2. Slug Method. Introduce water with a minimum chlorine concentration of 100 mg/l at a constant measured rate into the pipeline. Apply column or slug of chlorinated water that will, as it passes along the line, expose all interior surfaces for a period of three hours. Check the application at the upstream end of the line.
 3. Tablet Method. This method shall not be used if trench water or foreign material has entered the line or if the water is below 5°C (41°F). Because preliminary flushing cannot be used, this method shall only be used when scrupulous cleanliness has been exercised.
 - a. Place tablets in each section of pipe in sufficient number to produce a dose of 50 mg/l initial residual with a 20 mg/l residual after 24 hours.. Refer to Table 2 of AWWA C651, latest edition, for the required minimum number of tablets. All tablets within the main must be attached at the top of the pipe. Introduce water into the pipeline at a rate no greater than 1 ft./sec. and retain the water in the pipeline for a period of 24 hours after which period the treated water shall show detectable chlorine residual at each sampling point.
- F. Final Flushing. After the applicable retention period, heavy chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main fittings, valves, and branches until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system or that is acceptable for domestic use.
1. The environment to which the chlorinated water is to be discharged shall be inspected. If there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to neutralize thoroughly the residual chlorine. At no time shall chlorinated water from a new main be flushed into a body of fresh water. This is to include lakes, rivers, streams, drainage ways, and any and all other waters where fish or other water life can be expected.
- G. Bacteriologic Tests. Standard conditions. After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. At least one set of samples shall be collected from every 1,200 feet of the new water main, plus one set from the end of the line and at least one set from each branch. A minimum of two sampling points are required for any segment over 500 feet in length. All samples shall be tested for bacteriological (chemical and physical) quality in accordance with Standard Methods for the Examination of Water and Wastewater, and shall show absence of coliform organisms.

1. Collect samples in sterile bottles from sampling points furnished and installed by the Contractor in the main.
- H. Final Connections to Existing Mains. When connections to existing mains are made without a new valve at the connection point, new water main and appurtenances shall be installed, flushed, disinfected and satisfactory bacteriological sample results received prior to permanent connections being made to the active, existing system.
 1. Final connections or those portions of the new system installed that have not been disinfected as part of a previous disinfection procedure, shall be disinfected in accordance with Section 4.6 of AWWA C651.

3.11 MEASUREMENT AND PAYMENT

- A. The following section lists all waterline connection information, appurtenances, and details related to the waterline installation. Items shall be bid in accordance with the listed assumptions described below and shown on drawings.
- B. 18" C905 DR 18 Waterline
 1. *Description*
 - a. This line item is for the 18-inch PVC C905 DR-18 installed to a bury depth as shown in the project documents.
 2. *Specific inclusions, exclusions, or special considerations*
 - a. The line item shall include all overhead, labor, materials, equipment, and other associated costs for the 18-inch PVC C905 DR 18 Waterline portion of this project including excavation and backfill, bedding, compaction, CRBs, megalugs, blueboard insulation (when required), air/vac release valves and manholes (see drawing detail), and all fittings complete and in place as described in the project documents.
 3. *Payment Basis*
 - a. Linear Foot and Fittings per each
 4. *Estimated Quantities-(drawings take precedence)*
 - a. 6778 LF of 18" C900 DR 18
 - b. (24) 18" BFVs (note these include the 18" BFVs shown in the water main connection details)
 - c. (3) 18" 11.25-degree MJ bend
 - d. (4) 18" 22.5-degree MJ bend
 - e. (6) 18" 45-degree MJ bend
 - f. (2) Air/vac release valves and manholes (see drawing detail)
- C. Existing Water Main Connections
 1. *Description*
 - a. This line item is for connecting the new waterline to the existing waterline as detailed in project documents. There are a total of 12 water main connections. Reference drawing details A-K for supplemental information on the water main connection design including proposed layout and tie-in locations.
 2. *Specific inclusions, exclusions, or special considerations*

- a. The line item shall include all overhead, labor, materials, equipment, and other associated costs for connecting the new waterline to the existing water line at specified locations on Drawings. This includes excavation and backfill, bedding, compaction, thrust blocks, polywrap, tracer wire, megalugs, foster adapters (when required), abandonment, grouting, and capping of existing waterlines, and all other fittings and valves complete and in place as described in project documents.
- b. Note a majority of connections assume that the line can be connected upstream of an existing water valve (noted on drawings), therefore a new water valve is not included in the estimated quantities. However, if installing upstream of an existing valve is not feasible due to existing conditions, a new water valve shall be added to scope and installed.

3. *Payment Basis*

- a. Per Connection

4. *Estimated Quantities*

- a. Start of Line - Sta 0+98.66
 - 1) Pipe Length and Size: 12 LF of 12"
 - 2) Type and number of fittings:
 - a) (1) 12" MJ Tee
 - b) (1) 18"x12"x18" MJ Tee
 - c) (3) 12" Gate Valves
 - d) (2) 12" MJ Solid Sleeves
 - e) (1) 18" MJ Plug
- b. Station 3+30.48
 - 1) Pipe Length and Size: 29 LF of 8" & 1 LF of 6"
 - 2) Type and number of fittings:
 - a) (1) 18"x8"x18" MJ Tee
 - b) (2) 45 Degree MJ Fittings
 - c) (1) 8" Gate Valve
 - d) (1) 8"x6" MJ Reducer
- c. Station 4+92.41 (See Hager Connection Plan and Profile)
 - 1) Pipe Length and Size: 120 LF of 8" & 1 LF of 6"
 - 2) Type and number of fittings:
 - a) (1) 18"x8"x18" MJ Tee
 - b) (2) 8" 45 Degree MJ Fittings
 - c) (1) 8" Gate Valve
 - d) (1) 8"x6" MJ Reducer
 - e) (1) 6" Solid Sleeve
- d. Station 26+64.03
 - 1) Pipe Length and Size: 15 LF of 8"
 - 2) Type and number of fittings:
 - a) (1) 18"x8"x18" MJ Tee
 - b) (2) 8" 45 Degree MJ Fittings
 - c) (1) 8" Gate Valve
- e. Station 38+56.76
 - 1) Pipe Length and Size: 10 LF of 12"
 - 2) Type and number of fittings:
 - a) (1) 18"x12"x18" MJ Tee

- b) (2) 12" 45 Degree MJ Fittings
- c) (1) 12" Gate Valve
- f. Station 44+45.64
 - 1) Pipe Length and Size: 10 LF of 8"
 - 2) Type and number of fittings
 - a) (1) 18"x8"x18" MJ Tee
 - b) (2) 8" 45 Degree MJ Fittings
 - c) (1) 8" Gate Valve
- g. Station 52+98.22
 - 1) Pipe Length and Size: 10 LF of 8"
 - 2) Type and number of fittings
 - a) (1) 18"x8"x18" MJ Tee
 - b) (2) 8" 45 Degree MJ Fittings
 - c) (1) 8" Gate Valve
- h. Station 54+84.06
 - 1) Pipe Length and Size: 1 LF of 6" & 20 LF of 4"
 - 2) Type and number of fittings
 - a) (1) 18"x6"x18" MJ Tee
 - b) (1) 6"x4" MJ Reducer
 - c) (1) 4" Gate Valve
 - d) (1) 4" Solid Sleeve
 - e) (2) 4" 45 Degree MJ Fittings
- i. Station 59+33.98 (Mt. Sopris Drive)
 - 1) Pipe Length and Size: 70 LF of 10"
 - 2) Type and number of fittings
 - a) (1) 18"x10"x18" MJ Tee
 - b) (6) 10" 45 Degree MJ Fittings
 - c) (1) 10" Gate Valve
 - d) (1) 10" Solid Sleeve
- j. Station 64+89.27
 - 1) Pipe Length and Size: 34 LF of 8"
 - 2) Type and number of fittings
 - a) (1) 18"x8"x18" MJ Tee
 - b) (1) 8" 11.25 Degree MJ Fittings
 - c) (1) 8" 22.5 Degree MJ Fittings
- k. Station 65+84.59 (see School Plan and Profile)
 - 1) Pipe length and Size: 1 LF of 18" & 130 LF of 8"
 - 2) Type and number of fittings
 - a) (1) 18" WYE tee
 - b) (1) 8" Gate Valve
 - c) (1) 18"x8" MJ reducer
 - d) (2) 11.25 Degree MJ Fittings
 - e) (1) 8" MJ Tee
 - f) (2) 8" Solid Sleeves
- l. Station 68+72.91 (End of line)
 - 1) Pipe length and Size: 6 LF of 12"
 - 2) Type and number of fittings
 - a) (1) 18"x12"x18" MJ Tee
 - b) (1) 12" Gate Valve
 - c) (1) 18" MJ Plug

d) (2) 12" MJ Solid Sleeves

D. Fire Hydrant Assembly

1. *Description*

a. This line item is for the fire hydrant assemblies installed at locations shown in the project documents and detailed in drawings.

2. *Specific inclusions, exclusions, or special considerations*

a. This line item shall include all overhead, labor, materials, equipment and other associated costs for the fire hydrant assemblies portion of the project including excavation, backfill, bedding, compaction, valve and all fittings, hydrant restraint, and lateral piping complete and in place as described in project documents. Refer to fire hydrant assembly detail in drawings for complete inclusions of the Fire Hydrant Assembly bid item.

b. Note there is one exception to the standard Fire Hydrant Detail Drawing at Station 41+11.52, which has an 8" lateral before reducing to 6" at tee at hydrant. See drawings for details.

3. *Payment Basis*

a. Per Assembly

4. *Estimated Quantities*

a. Station 6+95.78

1) Pipe Length and Size: 20 LF of 6"

2) Type and number of fittings: refer to standard detail

b. Station 16+86.05

1) Pipe Length and Size: 22 LF of 6"

2) Type and number of fittings: refer to standard detail

c. Station 27+98.25

1) Pipe Length and Size: 16 LF of 6"

2) Type and number of fittings: refer to standard detail

d. Station 37+34.91

1) Pipe Length and Size: 18 LF of 6"

2) Type and number of fittings: refer to standard detail

e. Station 41+11.52

1) Pipe Length and Size: 25 LF of 8" and 3 LF of 6"

2) Type and number of fittings

a) (1) 18"x8"x18" MJ Tee

b) (2) 8"x6"x8" MJ Tee

c) (1) 8" Gate Valve

d) Refer to Standard detail for remaining required fittings and valves

f. Station 56+86.06

1) Pipe Length and Size: 30 LF of 6"

2) Type and number of fittings: refer to standard detail

E. Water Service Connections

1. *Description*

a. This line item is for the water service connections from the new 18" waterline to new and existing water service connections.

2. *Specific inclusions, exclusion or special considerations*
 - a. This line items shall include all overhead, labor, materials, equipment and other associated costs for the water service connections. Items include excavation and backfill, bedding, compaction and all fittings and appurtenances complete and in place as drawn in Drawing Water Service Connection detail.
 - b. The Contractor shall remove and dispose of all existing curb stops, valves, and other appurtenances currently in place (as long as the Owner does not want them).
3. *Payment Basis*
 - a. Per each service connection. Note all existing residential service lines are $\frac{3}{4}$ " and shall remain $\frac{3}{4}$ " upon reconnection. If existing residential service line differs from $\frac{3}{4}$ " reconnection shall be made at existing pipe size. All new service connections to be 1".
4. *Estimated Quantity*
 - a. Station 30+25.18
 - 1) 12 LF of $\frac{3}{4}$ "
 - b. Station 37+94.94
 - 1) 80 LF of $\frac{3}{4}$ "
 - 2) Note the Contractor is responsible for bringing new service line on customer side of curb stop behind wall (remain minimum 5 ft away from wall) and tying into existing service line next to house at City's discretion.
 - c. Station 41+50.32
 - 1) 35 LF of $\frac{3}{4}$ "
 - d. Station 42+57.78
 - 1) 20 LF of $\frac{3}{4}$ "
 - e. Station 42+61.84
 - 1) 20 LF of $\frac{3}{4}$ "
 - f. Station 50+76.86
 - 1) 28 LF of 1"
 - 2) Note this is a brand-new connection, with no existing infrastructure in place.
 - g. Station 53+58.98
 - 1) 45 LF of $\frac{3}{4}$ "
 - h. Station 55+29.70
 - 1) 28 LF of 1"
 - 2) Note this is a brand-new connection with no existing infrastructure in place.
 - i. Station 56+28.35
 - 1) 29 LF of 1"
 - 2) Note this is reconnecting to an existing irrigation connection, line should be re-connected as currently installed.
 - j. Station 62+14.50
 - 1) 40 LF of $\frac{3}{4}$ "
 - k. Station 66+74.82
 - 1) 90 LF of $\frac{3}{4}$ "

- I. Station 66+89.98
 - 1) 92 LF of $\frac{3}{4}$ "
- m. Station 68+06.31
 - 1) 70 LF of $\frac{3}{4}$ "

END OF SECTION

SECTION 15103
BUTTERFLY VALVES

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish and install butterfly valves, and all necessary operators, valve stems, valves and accessories for a complete operable assembly as shown and indicated on the Drawings and as specified herein.

1.02 REFERENCES

- A. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
 - 1. AWWA C500 – Metal-Seated Gate Valves for Water Supply Service.
 - 2. AWWA C504 – Rubber-Seated Butterfly Valves.
 - 3. AWWA C540 – Power-Actuating Devices for Valves and Sluice Gates.
 - 4. AWWA C550 – Protective Interior Coatings for Valves and Hydrants.
 - 5. AWWA C606 – Grooved and Shouldered Joints.
 - 6. NSF 61 – Drinking Water System Components - Health Effects.

1.03 SUBMITTALS

- A. Product Data—Provide complete data on valve accessories sufficient to verify compliance with the specifications:
 - 1. Provide manufacturer's catalog information with size, dimensions, number of turns to open, materials, and assembled weights. Indicate valve pressure temperature rating.
- B. Manufacturer's certificate: Provide Affidavit of Compliance to certify that products meet or exceed specified requirements.
- C. Test reports: Submit reports of shop pressure tests, AWWA C504.

1.04 OPERATION AND MAINTENANCE DATA DESCRIPTION

- A. Maintenance data: Include installation and maintenance instructions, recommended spare parts lists and exploded assembly views of valves, operators and accessories.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products to site as specified and in accordance with manufacturer's instructions.
- B. Deliver and store valves and accessories in shipping containers with labeling in place in accordance with AWWA C504, Section 6:
 - 1. Seal valve ends to prevent entry of foreign materials into valve body.

2. Box, crate, or otherwise completely enclose valves, operators and accessories to protect against damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Kennedy
 2. Mueller
 3. DeZurik.
 4. Milliken
 5. Keystone
 6. Engineer Approved Equal

2.02 FABRICATION

- A. General:
 1. Rubber seat, tight closing discs seat at 90 degrees with pipe axis.
 - a. Shaft: Keys and pins for securing disc to shaft to be 18-8 stainless steel.
 2. Valve ends suitable for specified use:
 - a. Wafer, grooved or flanged type for interior piping.
 - b. Mechanical joint type on buried piping.
 3. Materials:
 - a. Body: Cast iron.
 - b. Shaft: Stainless steel, one piece.
 - c. Disc: Bronze or cast iron with corrosion-resistant metal plating.
 - d. Seat: Synthetic rubber or other elastomer with suitable temp rating.
 - e. Shaft bearings: Bronze or Teflon.
 - f. Shaft seal: Suitable synthetic rubber rings.
 4. Maximum working pressure:
 - a. 250 psig
- B. Valve actuators:
 1. Buried valves as indicated on Drawings: Wrench nuts.
 2. Adequate to seat, unseat, and maintain valve position under all operating conditions.
 3. Counter clockwise (to the left) to open.

2.03 SHOP FINISHING

- A. All shop finishes, coatings, sealers, and treatments must be adhere to law 40 CFR Volatile Organic Compound Content Limits for Architectural Coatings, in effect beginning May 1st, 2020.
- B. Shop paint all ferrous metal surfaces of valves and accessories, both interior and exterior for corrosion protection.
- C. Manufacturer's standard paint will be acceptable if it is functionally equivalent to the specified paint and compatible with the specified field painting.

- D. Surfaces to be painted:
 - 1. Unfinished surfaces:
 - a. Interior of valves; Asphalt varnish (2 coats) coat tar, or epoxy for potable water applications.
 - b. Exterior of other valves to be buried, submerged, or located in manholes: Asphalt varnish or coal tar.
 - c. Exterior of other valves: Rust-inhibitive primer.
 - d. Actuators and accessories: Rust-inhibitive primer.
 - e. Flange faces and interior working parts: Rust-preventative compound.
 - 2. Air service:
 - a. Interior of valve: Suitable for continuous air service at the rated temperature.
 - b. Exterior of valve: Rust-inhibitive primer suitable for air service at the rated temperature.

2.04 SOURCE QUALITY CONTROL

- A. Shop test in accordance with AWWA C504.
- B. Valve to be driptight on completion of tests.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install valves and accessories in accordance with the manufacturer's instructions.
- B. Check and adjust valves and accessories for smooth operation in accordance with manufacturer's instructions.

3.02 FIELD QUALITY CONTROL

- A. Coordinate inspection of all valves by manufacturer's representative and instruct plant personnel on their operation and maintenance.

END OF SECTION